Report:

Imperial Oil, Nanticoke Refinery
Acid Gas Minimization Plan Under the Requirements of Ontario Regulation 530/18

Submitted to:

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Nanticoke Refinery
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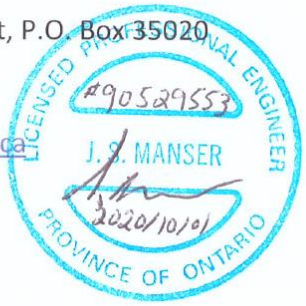

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Revision History

Version	Date	Summary Changes/Purpose of Revision
1	October 1, 2020	None

EXECUTIVE SUMMARY

This Acid Gas Combustion Minimization Plan was prepared to satisfy the requirements of Section 9(1) of Ontario Regulation 530/18 "Air Pollution – Discharge of Sulphur Dioxide from Petroleum Facilities" (O. Reg. 530/18). The North American Industry Classification System (NAICS) Codes that apply to this Facility include 324110 (Petroleum Refineries). Therefore, Imperial Oil Limited (Imperial) is required to comply with O. Reg. 530/18.

The regulatory requirements state that subject Facilities are required to, on or before July 1, 2020, submit a plan to the Director titled "Acid Gas Combustion Minimization Plan". In response to the challenges faced during the COVID-19 outbreak the Ministry of Environment, Conservation and Parks (MECP) indicated that they would accept the Acid Gas Combustion Minimization Plan by October 1, 2020.

The plan required under Section 9(1) must be dated, signed and sealed by a licensed engineering practitioner and must set out the practitioner's name and license number. The plan shall identify the:

- acid gas combustion equipment and upstream processes which may vent into the equipment;
- measures taken to minimize the combustion of acid gas;
- measures intended to be implemented in the future to minimize acid gas combustion;
- operating condition(s) during which the above measure(s) would minimize flaring or otherwise combustion of acid gas;
- methodology to be followed when performing the analysis of the primary cause of the discharge from the acid gas combustion equipment;
- methodology to be followed for the purpose of identifying the measures that are available to prevent or reduce the risk of recurrence of acid gas combustion;
- identification of the measures that are available to prevent or reduce the risk of a similar discharge happening, and
- information with respect to each time sulphur dioxide was discharged from acid gas combustion equipment at the facility as a result of a sulphur recovery unit failing to operate in a normal manner.

This Acid Gas Combustion Minimization Plan will be updated, on or before July 1st, of each year with information from the previous calendar year and a summary of this plan will be posted on the Facility's website for a period of five years.

ORTECH Consulting Inc. (ORTECH) was retained by Imperial to prepare this Acid Gas Combustion Minimization Plan under the requirements of O. Reg. 530/18 for their Nanticoke Operations.

Imperial Oil's Nanticoke refinery operations has the capacity to process up to 20,000 cubic meters per day of crude oil to produce propane and propylene, butane, gasoline, furnace fuel, diesel oil, aviation fuel, heavy fuel oil, and asphalt. The refinery is located on more than 600 hectares of land in the

Municipality of Haldimand County. The site straddles Concession Road 2 about two kilometres east of Regional Road 55. The process units and storage tanks are located on the north side of Concession Road 2, while the refinery's wastewater treatment plant and on-site waste management area ("landfarm") are located south of Concession Road 2.

Acid gas combustion equipment covered under this Plan includes the:

- North flare, and
- South flare.

Imperial has implemented several measures at the Facility to minimize the frequency, duration and magnitude of flaring or otherwise combusting acid gas as listed in Table 1.

Table 1: Implemented Measures to Minimize Acid Gas Combustion

Measure Taken	Associated Operating Condition	Date of Implementation
Install amine storage and associated amine diversion facilities and procedures. Amine diversion immediately reduces acid gas production from upstream process units in the event of a Sulphur plant trip. Actions taken minimize the amount of acid gas combusted within either the incinerator or flare.	During an unplanned shutdown of the SRU	Already in place
Install rich amine flash drums.	Part of base unit design	Already in place
Ensure sour water separation. Sour water separation (SWS) occurs in 4 areas of the system (in order); process unit separation drum, SWS feed drum, Sour water tankage, SWS overhead drum. At Nanticoke all of these rely on gravity/residence time separation only.	Part of base unit design	Already in place
Install sour water storage tanks. The site strategy is to have 2 dedicated sour water tanks available in the event of SWS or SRU outage. There are additional tanks available in other services if needed.	SWS or SRU outage	Already in place
Using oxygen enrichment. Oxygen enrichment up to 28 vol% is actively used to manage SRU hydraulic constraints to margin capture.	Part of base unit design	Already in place
A temporary nitrogen line was installed and tied-in to the acid gas feed line to the Sulphur Recovery Unit (SRU) reaction furnace to provide supplemental burner flow for shutdown and startup during the 2019 turnaround maintenance event.	During turn down and start up	August 2019
Procedures were revised for using the temporary nitrogen line for shutdown and startup to reduce acid gas flaring, and operators were trained in the new procedure.	During turn down and start up	August 2019

Table 1: Implemented Measures to Minimize Acid Gas Combustion (continued)

Measure Taken	Associated Operating Condition	Date of Implementation
Updated site procedures to minimize the magnitude of acid gas flaring in the event of an SRU shutdown.	During an unplanned shutdown of the SRU	August 2019
Installed permanent Nitrogen connection to SRU reaction furnace to minimize acid gas to flare in future shutdown or turndown events upstream of SRU.	During turn down and start up	April 2020

Imperial intends to implement several measures at the Facility to minimize the frequency, duration and magnitude of flaring or otherwise combusting acid gas as listed in Table 2.

Table 2: Measures to be Implemented to Minimize Acid Gas Combustion

Measure to be Taken	Associated Operating Condition	Date of Expected Implementation
A capital project has been initiated to complete the design, engineering, and construction required to enable future acid gas flareless shutdown and start up	During startup and turndown	These facilities will be installed at the next planned SRU maintenance shutdown